

Demonstration of a Nano-Enabled Space Power System

Completed Technology Project (2016 - 2018)



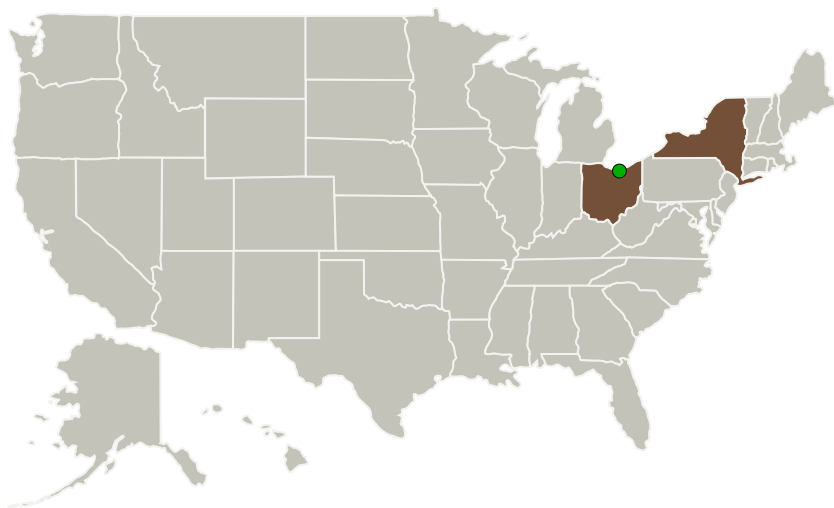
Project Introduction

The Nano-Enabled Space Power System project will demonstrate power systems with nanomaterial-enhanced components as a replacement for CubeSat power generation, transmission, and storage. The use of nanomaterials in solar cells, wire harnesses, and lithium ion batteries can increase the device performance without significantly altering the device's physical dimensions or the device's operating range (temperature, voltage, current).

Anticipated Benefits

The use of nanomaterials can reduce weight while simultaneously widening the viable range of operating conditions power system components such as increased depth of discharge of lithium ion batteries, tunable bandgaps in solar cells, and increased flexure tolerance of wire harnesses.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Rochester Institute of Technology(RIT)	Lead Organization	Academia	Rochester, New York
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio



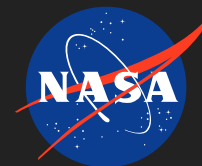
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Primary U.S. Work Locations

New York

Ohio

Project Transitions

 **August 2016:** Project Start

 **August 2018:** Closed out

Closeout Summary: Carbon nanotube enhanced lithium ion batteries were integrated into a payload for a July 2018 high altitude balloon launch in conjunction with NASA GRC. Nano-Enhanced power system components have been successfully tested under AM0 LEO conditions. RIT has begun final assembly of the integrated power systems in an ISIS CubeSat chassis. Results of this program have successfully advanced the TRL level of the QD/QW PV cells, CNT wire harness, and Li+ batteries and opened the door for future NASA CubeSat launch initiatives.

Project Website:

https://www.nasa.gov/directorates/spacetech/small_spacecraft/index.html#.Vt

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Rochester Institute of Technology (RIT)

Responsible Program:

Small Spacecraft Technology

Project Management

Program Director:

Christopher E Baker

Program Manager:

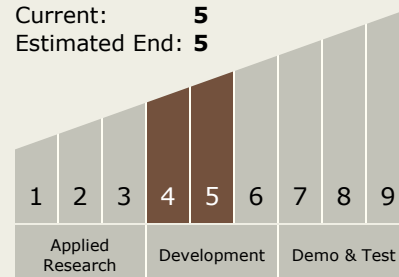
Roger Hunter

Principal Investigator:

Ryne P Raffaele

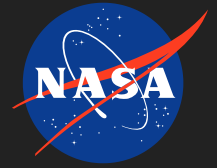
Technology Maturity (TRL)

Start: 4
Current: 5
Estimated End: 5



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Target Destination

Earth